#35
LC
1/31/05

Appeal to Board of Patent Appeals and Interferences

Appeal No.: 2004-0883
Appellant: Mills, Randell L.
Application Ser. No.: 09/220,970

Attention of:
Honorable James D. Thomas
Honorable Michael R. Fleming
Honorable Stuart Levy

* * * * *

Filed Via Facsimile

January 27, 2005

SUBMISSION TO BOARD OF PATENT APPEALS AND INTERFERENCES UNDER RULE 196(d) IN RESPONSE TO REQUIREMENT TO ADDRESS MATTERS FOR DECISION IN THE PENDING APPEAL

Board of Patent Appeals and Interferences
U.S. Patent and Trademark Office
P.O. Box 1450
Alexandria, Virginia 22313-1450

Sirs:

During the hearing held on January 25, 2005 in the above-identified appeal, the U.S. Patent and Trademark Board of Patent Appeals and Interferences (PTO Board) required that Appellant address two matters it deemed appropriate for rendering a reasoned decision in this case under 37 C.F.R. § 196(d). This Submission addresses those matters by providing definitions for two claim terms used in the claims under appeal. i.e., "Fourier series in Fourier space" and "probability operand," which terms are supported by the originally filed disclosure.

Fourier Series in Fourier Space

Appellant submits that one skilled in the art would define the term "Fourier series in Fourier space" based on the originally filed disclosure as follows:

> **A Fourier series in Fourier space is a sum of trigonometric functions in frequency space where each variable is frequency and the parameters of the Fourier series are input data or processed input data.**

The term "frequency space" is well known in the art of Fourier analysis and processing and is disclosed in the present specification as shown below. In the examples found throughout the present specification, frequency space is shown by (k, ω – space). Examples of variables that are frequency are k_p and k_s.

In support of Appellant's definition of "Fourier series in Fourier space," Appellant cites the following disclosure found in the present specification:

Page 67, lines 15-16: "the Fourier series is a sum of trigonometric functions in k, ω – space."

Page 7, lines 4-6: "a Fourier series in Fourier space represents the information parameterized according to the data and input context"; page 36, line 8: "trigonometric functions in frequency space (k, ω – space)"; page 36, line 17: "Fourier series in k, ω – space"; page 38, lines 9-10: "Input Layer receives data and transforms it into a Fourier series in k, ω – space wherein input context is encoded in time as delays..." compared with page 7, lines 14-17: "Input Layer 12 receives the data within the input context and transforms the data into the Fourier series in Fourier space representative of the information"; page 43, lines 3-4: "Fourier series – sums of trigonometric waves that are frequency matched and periodically in phase --...."

Page 95, lines 4-12: "Input Layer receives data and transforms it into a Fourier series in k, ω – space wherein input context is encoded in time as delays ... The Fourier series in Fourier space represents information parameterized according to the data and input context."

Page 8, line 19 to page 9, line 9: "Referring to FIGURE 2, in the first step, the Input Layer 12 receives the data from the transducer (not shown). A Fourier transform processor 22 encodes each data element as parameters of a Fourier component in Fourier space and stores the data parameter values to the Input Layer section 24 of the memory 20. Each Fourier component of the Fourier series may comprise a quantized amplitude, frequency, and phase angle. For example the Fourier series in Fourier space may be:

$$\sum_{m=1}^{M}\sum_{n=-\infty}^{\infty}\frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}}a_{0_m}N_{m_{\rho 0}}N_{m_{z0}}\sin\left(\left(k_\rho-n\frac{2\pi}{\rho_{0_m}}\right)\frac{N_{m_{\rho 0}}\rho_{0_m}}{2}\right)\sin\left(\left(k_z-n\frac{2\pi}{z_{0_m}}\right)\frac{N_{m_{z0}}z_{0_m}}{2}\right)$$

having a quantized amplitude, frequency, and phase angle, wherein a_{0_m} is a constant, k_ρ and k_z are the frequency variables, n, m, and M are integers, and $N_{m_{\rho_0}}$, $N_{m_{z_0}}$, ρ_{0_m}, and z_{0_m} are the data parameters.

In a first embodiment, the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component are proportional to the rate of change of the physical characteristic. Each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the amplitude of the physical characteristic.. In the triangle example, the amplitude of the voltage at a given CCD element relative to the neighboring CCD element defines the rate of change of the voltage which is converted into the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$. The inverse of the amplitude of the voltage of each CCD element is converted into the data parameters ρ_{0_m} and z_{0_m}. As illustrated in FIGURE 3 and described above, for each CCD element, the Fourier series, parameterized accordingly, are stored to a specific sub register 27 of a specific register 26 of the Input Layer section 24 of the memory 20. Since the structure of a Fourier series is known in the art, only the parameters need to be stored in a digital embodiment."

<u>Page, 9, line 24 to page 10, line 11</u>: Defining the data and processed data as the parameters of the Fourier series in Fourier space. See also <u>page 11, line 26 to page 12, line 2</u>; <u>page 15, line 9 to page 16, line 13</u>; and <u>page 18, line 23 to page 19, line 13</u>.

<u>Page 59, lines 16-32</u>: "Representing information is a series of trigonometric functions. Thus, in one embodiment of the present invention, the "processor" is an analog Fourier processor. According to the Fourier theorem any waveform can be recreated by an infinite series of trigonometric functions.

$$x(t) = a_0 + \sum_{n=1}^{\infty} a_n \cos \omega_n t + \sum_{n=1}^{\infty} b_n \sin \omega_n t \qquad (37.37)$$

where a_0, a_n, and b_n are constants. And, any aspect of the universe can be represented by an infinite series of sine and cosine functions as processed by the "processor". For the present "processor", the trigonometric function is the basis element

of information. And, the complexity or information content of any analog waveform or digital equivalent is reducible to the number of Fourier components required for its assimilation.

A unique feature of the present invention is that information is encoded in a Fourier series in k,ω – space versus a conventional Fourier series in time and space."

Support for processing the input data to form the Fourier series in Fourier space by parameterization of the series components with the data or processed data is given at: <u>page 8, line 19 to page 9, line 9</u>; <u>page 9, line 26 to page 10, line 11</u>; <u>page 11, line 26 to page 12, line 2</u>; <u>page 15, line 9 to page 16, line 12</u>; <u>page 18, line 23 to page 19, line 12</u>; <u>page 38, line 9 to page 38, line 22</u>; <u>page 95, line 1 to page 96, line 12</u>. An example of linear differentiation of the data as the input is given at <u>page 56, lines 10-12</u> and <u>page 57, line 46</u>.

<u>Page 9, line 26 to page 10, line 11</u>: "In a second embodiment, each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the amplitude of the physical characteristic. Each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the rate of change of the physical characteristic. As in the first embodiment, for each CCD element, these parameters are stored in a specific sub register of the Input Layer section of the memory.

In a third embodiment, each of the data parameters $N_{m_{\rho_0}}$ and $N_{m_{z_0}}$ of the Fourier series component is proportional to the duration of the signal response of each transducer. Each of the data parameters ρ_{0_m} and z_{0_m} of each Fourier component is inversely proportional to the physical characteristic. As in the first embodiment, for each CCD element, these parameters are stored in a specific sub register of the Input Layer section of the memory.

As an alternative example, the Fourier series in Fourier space may be:

$$\sum_{m=1}^{M}\sum_{n=-\infty}^{\infty}\frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}}\frac{4}{\rho_{0_m}z_{0_m}}a_{0_m}\sin\left(\left(k_\rho-n\frac{2\pi}{\rho_{0_m}}\right)\frac{N_{m_{\rho_0}}\rho_{0_m}}{2}\right)\sin\left(\left(k_z-n\frac{2\pi}{z_{0_m}}\right)\frac{N_{m_{z_0}}z_{0_m}}{2}\right)$$

having a quantized frequency, and phase angle, wherein a_{0_m} is a constant, k_ρ and k_z are the frequency variables, n, m, and M are integers, and $N_{m_{\rho_0}}$, $N_{m_{z_0}}$, ρ_{0_m}, and z_{0_m} are the data parameters. As described with respect to the previous example, for each CCD element, these parameters are stored in a specific sub register of the Input Layer section of the memory."

The trigonometric functions can be converted to complex exponential form using Euler's relationship as shown between equations 37.83 and 37.84 on page 70 of the present application. Thus, the term "trigonometric function" also includes complex exponential functions.

Probability Operand

With respect to the claim term "probability operand," Appellant submits that one skilled in the art would define that term based on the originally filed disclosure as follows:

> **A probability operand is a system that returns a binary number in response to a probability-expectation-value or activation-probability-parameter input according to a specific statistic. The value of the operand causes a specific action, such as adding Fourier series to form a string, storing a summed Fourier series to memory, or activating a component of the system.**

In support of Appellant's definition of "probability operand," Appellant cites the following disclosure found in the present specification:

Page 2, lines 25-32: "determining a probability expectation value based on the spectral similarity, and generating a probability operand having a value selected from a set of zero and one, based on the probability expectation value. These steps are repeated until the probability operand has a value of one. Once the probability operand has a value of one, the modulated Fourier series and the other Fourier series are added to form a string of Fourier series in Fourier space, and the string of Fourier series is stored in the memory."

Page 3, lines 11-17: "determining a probability expectation value based on the spectral similarity, and generating a probability operand having a value selected from a set of zero and one, based on the probability expectation value. These steps are repeated until the probability operand has a value of one. Once the probability operand has a value of one, this aspect includes storing the summed Fourier series to an intermediate memory section."

Page 4, lines 18-30: "This aspect of the invention includes generating an activation probability parameter, storing the activation probability parameter in the memory, generating an activation probability operand having a value selected from a set of zero and one, based on the activation probability parameter, activating any one or more components of the present invention such as matrices representing functions, data parameters, Fourier components, Fourier series, strings, ordered strings, components of the Input Layer, components of the Association Layer, components of the String Ordering Layer, and components of the Predominant Configuration Layer, the activation of each component being based on the corresponding activation probability parameter, and weighting each activation probability parameter based on an activation rate of each component."

Page 12, lines 19-22: "The system generates a probability operand having a value selected from a set of zero and one, based on the probability expectation value. The system recalls at least another Fourier series from the memory if the operand is one."

Support for specific statistics for the operand are given at page 78 line 27 to page 79, line 4: "The probability of "association" of Fourier series was herein derived for Poissonian statistics using delayed Gaussian filters; however, the invention is not limited to Poissonian statistics and the use of Gaussian filters. In other embodiments, the "association" can be based on alternative statistics corresponding to their respective distributions. Examples are Gaussian or normal statistics, binomial statistics, Chi-square statistics, F statistics, and t statistics. Other statistical distributions are given in Hogg and Tanis [18] which are herein incorporated by reference."

Conclusion

Appellant respectfully submits that the definitions provided above regarding the claim terms "Fourier series in Fourier space" and "probability operand," which address the matters required by the PTO Board at the January 25, 2005 hearing, are sufficient to allow it to render a reasoned decision in the present appeal favorable to Appellant.

Respectfully submitted,

Manelli, Denison & Selter, PLLC

By

Jeffrey S. Melcher
Reg. No.: 35,950
Tel. No.: 202.261.1045
Fax. No.: 202.887.0336

Customer No. 20736

FROM

Manelli, Denison & Selter PLLC
Customer No. 20736
Telephone: (202) 261-1000

Our Facsimile #: (202) 887-0336

FACSIMILE TRANSMISSION

TO: UNITED STATES PATENT AND TRADEMARK OFFICE

FACSIMILE #: 571.273.0299

No. Pages (Including this page) 8 FAX Opr: JSM

IF YOU DO NOT RECEIVE CLEARLY ALL PAGES, PLEASE CONTACT US IMMEDIATELY
By Telephone **AT: (202) 261-1045** **(local)**

->->-> USPTO:
PLEASE ACKNOWLEDGE CLEAR RECEIPT OF ALL PAGES INDICATED ABOVE BY FAXING THIS PAGE BACK TO ONE OF OUR FACSIMILE NUMBERS STATED ABOVE

Appeal to Board of Patent Appeals and Interferences

Appeal No.: 2004-0883
Appellant: Mills, Randell L.

Application Ser. No.: 09/220,970

Attention of:
Honorable James D. Thomas
Honorable Michael R. Fleming
Honorable Stuart Levy

Name or type of signed paper being transmitted: Rule 196(d) Submission

CERTIFICATE OF FACSIMILE TRANSMISSION

I hereby certify that this paper is being facsimile transmitted to the Patent and Trademark Office on the date shown below.

Name Jeff Melcher Sig. [signature] Date January 27, 2005